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Seat
TITLE OF THE INVENTION

SEAT

The invention relates to a seat, ~~in particular a seat with~~ particularly a seat having a stable base and with a ~~sitting~~seating surface and with an upper-body support.

BACKGROUND OF THE INVENTION

~~Different~~Various attempts have been made to ~~provide seats,~~design seats that support an ergonomic sitting posture, ~~this in particular in connection with~~particularly in respect of office chairs ~~resp.~~and seats for PC workstations. Accordingly, there are designs that resemble rocking-Thus ~~there are for example~~ rocking-chair-like constructions,chairs, seats with knee supports and seat-balls. ~~All~~However, all these seats ~~however lead~~give rise to relatively ~~eramped~~tense sitting postures, since on the one hand the moving ~~sitting surface has to be stabilized and on the other hand parts of the body like shins, crucial ligaments and the tips of the foot are severely stressed in an unaccustomed way.~~ seating surface must be stabilized, and on the other, parts of the body such as the shins, cruciate ligaments and the extremities of the foot are placed under unaccustomed stress.

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CROSS REFERENCE TO RELATED APPLICATIONS

There are also seats having forcibly driven seating surfaces, as are disclosed for example in German Patent No. DE 33 24 788 A1 and in European Patent Nos. EP 0 311 993 A2 and EP 0 574 073 A1. However, the seats described in these documents are relatively limited in the motion of their seating surfaces and usually only allow the seating surface to be displaced in one direction, for example up and down as in EP 0 311 993 A2 or turning from side to side as in EP 0 574 073 A1. Only the DE 33 24 788 A1 discloses a seat having a seating surface which is displaceable in two directions of motion, this being effected by lifting means that can raise the seating surface, and in this connection the seating surface can be raised and lowered in the same plane and may be tilted laterally in a circle.

~~The~~Unlike the above, it is object of the present invention ~~is to provide a seat that offers an alternative for this~~ to create a seat with a particularly ergonomically movable seating surface.

The invention suggests a seat having the characteristics of patent^{claim 1.}

BRIEF SUMMARY OF THE INVENTION

~~As a solution the invention on the one hand proposes a seat with a sitting surface that is forced to move continuously and cyclically. Differently as with~~Unlike all known seats the body does not need to tense up to keep the ~~sitting~~seating surface in position. The muscle work that is actually desirable with all known seats as well, is ~~insured~~assured

by the ~~body being forced to~~ fact that the body must follow the movement of the seat. In this ~~connection the human body is already accustomed to such a following of a given movement from a child, for example by~~ respect, the human body has been accustomed to imitating such movement from an early age, for example from being carried by the mother, or when walking or riding. ~~As everybody knows, such compulsory~~ It is common knowledge that such constraining movements have a relaxing effect and ~~can~~ may even serve therapeutic purposes. The moving seating surface is not intended to perform a vibratory movement, but ~~purposes as well. The moved sitting surface shall not carry out a vibratory movement but a pleasant, calm and even movement.~~ instead a pleasant, gentle and even motion. Additional vibratory movements would be conceivable.

~~It goes without saying that~~ Naturally, the amplitude ~~of the motion is adapted in such a~~ is adjusted to this motion in such manner that it is possible to keep the upper part of the body ~~nearly~~ almost still. By continuously following the movement of the ~~sitting surface with a nearly stationary~~ seating surface while the upper part of the body remains practically stationary, very many muscles are ~~kept busy~~ exercised during sitting without becoming tensed. The advantages of a seating surface having a continuous and cyclical constraining movement become ~~cramped. The advantages of a sitting surface, that is forced to move continuously and cyclically, follow in particular, when the seat resp. the sitting~~ apparent particularly when the seat or the seating surface are realized in a manner, that they encourage if not even enforce such manner that they encourage, or possibly even constrain an upright sitting posture. ~~Such sitting surfaces are actually well known,~~ Seating surfaces of such kind are known, for example a ~~sitting~~ seating surface may be used that ~~is taken from a saddle shape~~ borrows its shape from the saddle. In particular, the ~~sitting surface can be realized in a manner~~ seating surface may be configured such that an upright sitting posture may be assumed with a straight back and a normal curvature of ~~an indicated hollow back can be taken up, in which the upper thigh is~~ the lower spine, the upper thighs being relieved of pressure.

Such an upright sitting posture may be assured with ~~an~~ the appropriate selection of a ~~sitting surface can be ensured by the fact that the sitting surface is shifted in its angle of~~ the seating surface by altering the angle of

~~inclination. Favorably, this shifting can take place in sitting direction~~inclination of the seating surface. Such displacement may advantageously be effected in the direction of sitting as well as laterally. In particular, it is also possible to rotate the ~~sitting~~seating surface slightly relative to the horizontal. ~~Likewise it can be intended to shift the sitting surface in its height.~~Likewise, provision may be made to displace the seating surface relative to the vertical.

Means may be ~~provided, which forcibly move~~provided that force at least one point of the ~~sitting~~seating surface to move continuously and cyclically in at least two directions of motion periodically, whereby the number of one period is larger, preferably twice as large, as the number of the other period. ~~This~~In this way, a movement resembling a ~~gait~~walking movement ~~can~~may be simulated by relatively simple means, such as it occurs when riding in alternating~~gait~~ or ambling ~~motion resp.~~gait, or when being carried. In particular it is possible that for the execution of such movements the ~~sitting surface is~~seating surface may be tilted accordingly.

~~As a further solution, the invention suggests a seat with~~In addition the seat may comprise a preferably stable base and ~~with a sitting surface,~~a seating surface that may be shifted in its angle of inclination aroundabout a center of motion. ~~By such an arrangement it is possible, independently~~With such an arrangement, regardless of the other characteristics of the seat, ~~to ensure on the one hand a body relieving movement while sitting and on the other hand~~it is possible to assure not only a movement that relaxes the body during sitting, but also an ergonomically favorable body posture regardingwith respect to a workstation or a work surface. ~~Thus~~Accordingly the stable base ensures; that a central position, for example in front of a monitor or a keyboard cannot be left, ~~and still a slight body movement can be carried out if self-induced or forcibly moved.~~yet a slight movement of the body is carried out - whether voluntarily or in response to force.

In ~~particular it is possible as well~~, particular, it is also possible to shift the center of motion, preferably in its distance ~~to the sitting~~ from the seating surface and/or in its distance ~~to the base. By this on the one hand the change of~~ from the base. In this way, both the change in the angle of inclination and ~~on the other hand~~ the height of the ~~sitting surface can~~ seating surface may be influenced. The movement ~~can~~ may also be developed in such a manner that ~~not~~ one specific center of motion ~~can be~~ is not defined and ~~merely only~~ the inclination of the ~~sitting~~ seating surface may be altered. altered accordingly.

In particular it is also possible, to ~~carry out the shifting of~~ shift the center of motion ~~in dependence on the shifting of the sitting surface,~~ depending on the displacement of the seating surface so that the course of motion ~~can~~ for the seating surface may be selected relatively freely ~~for the sitting surface~~.

Regardless of whether the ~~change of~~ angle of inclination of the ~~sitting surface is carried out freely or by force, the sitting surface can~~ seating surface is changed freely or forcibly, the seating surface may be supported resiliently. This may be achieved for example by a spring element that ~~acts~~ is effective between the sitting surface mounting and the base ~~between the mounting of the seating surface and the base thereof~~. It is also possible to ~~designate~~ provide a suitable resilient guide for the ~~sitting surface. By such a suspension, jerky movements are avoided which would on the one hand~~ seating surface. Such a suspension means eliminates sharp movements that would disturb an even course of motion ~~as well as~~ and lead to tension, and ~~on the other hand would have the consequence,~~ would also have the consequence that the compensating movement carried out subconsciously in response to the seat would become conscious ~~in an unwanted~~ suddenly and in an undesirable way and so lead to ~~a~~ cause distraction from a concentrated activity.

~~It goes without saying that the sitting~~ Of course, the seating surface does not ~~necessarily~~ have to be ~~shiftable~~ displaceable about a physically existing center of motion. ~~Rather an appropriate guide~~ Instead, a suitable guide

~~of the sitting surface can be intended,~~ may also be provided for the seating surface that shifts it about a virtual center of motion. Such a guide may be planned arranged for example directly underneath the ~~sitting~~ seating surface itself, so that the entire base below the complete base underneath the sitting surface can be carried out in a known way as a normal seat base, if need be seating surface may be designed as a normal seat-base in known manner, possibly even with casters or the like.

In ~~particular the last mentioned~~ particular, this last arrangement may be carried out as a footrest or as a stand instead of a sitting surface, that is located realized as a footstool or a stand, instead of a seating surface, standing directly on the ground and being forced to move continuously and cyclically. Under these ~~In this connection~~ all circumstances, of course all the patterns of motion previously described ~~motion pattern can of course~~ may still be realized for this ~~footrest resp. stand and result in similar advantages. The sitting~~ footstool or stand, and similar advantages may be achieved. The seating surface according to the invention is especially suitable for office chairs. With such application a stable base makes it possible ~~in~~ provides a particularly suitable way that a person remains in a prescribed position in correct posture in reference to a work surface resp. a computer. In particular the invention method for ensuring that a person maintains the correct posture as prescribed with respect to a work surface or a computer. In particular, the invention may also be installed in motor-vehicles, and/or in the form of car seats. Here in particular, it may successfully prevent symptoms of fatigue during long journeys. A hazard can be realized also in motor-vehicles resp. with car seats. Here in particular it can successfully prevent fatigue symptoms during long rides. By switching the movement off in emergency situations here a hazard potential can be reduced. Likewise potential may be reduced by the movement being switched off in emergency situations. Likewise, a seat according to the invention can may be used with train driver's cabs resp. in drivers' cabs and in airplanes, with the same advantages obtained. airplanes and show the same advantages. Beyond that, Moreover, it is possible to use a seat according to the invention as a reclining aid, when it is designed in a plain or flat way, or when if its design is of correspondingly low construction, or if it is integrated into a couch. In an application of such a kind, a seat according to the invention may be effective

against ~~a Dekubitus~~ bedsores. A seat according to the invention may ~~be intended also in~~ also be provided in the form of an armchair.

As ~~already described above the sitting surface resp. also the footstool resp. the stand can~~ has been described in the foregoing, the seating surface or footstool or stand may be moved forward and backward, up and down as well as laterally. In particular, however, tumbling gyrating motions are also possible ~~particular however tumbling gyro-scope movements are possible as well, (like for instance with a Hula- (such as are performed for instance in a Hula or belly-dance) or tumbling up-down gyro-scope movements (like~~ vertical gyrating motions (similar to a roller-coaster). In addition, however, the seating surface may also execute a rocking, U-shaped motion in which the sides rise and fall alternately, as with a horse in gait, or a swinging motion as with an ambling camel. A movement similar to the leap of a dolphin is also possible, in which the seating surface is moved ~~with a roller-coaster~~. ~~Beyond that the sitting surface can execute a U-shaped side-alternating up-down movement as well, like a horse in walk or a seesaw motion like a dromedary in ambling motion. A movement similar to a dolphin jump is possible as well, at which the sitting surface is being moved forward along forward in an arc and then straight backward. It goes without saying, that~~ Naturally, other movements are conceivable as well, which ~~can~~ may be selected especially in accordance ~~to~~ with the feeling of well-being of the user or according to medical points of view as well user, or also for medical purposes.

In order to ~~ensure~~ assure the desired movements, all known drive means, guides and transmissions may be used. ~~So~~ Thus a desired movement may be generated for example by a sliding pin guided in a groove. ~~In addition, it is~~ However, it is also possible to drive the ~~sitting surface by~~ seating surface using an appropriate gear linkage. In particular an ~~angular lever~~ arrangement can be intended, of angular levers may be provided by which - depending upon ~~careful shaping~~ the precise configuration and arrangement of the angular lever - most diverse motion patterns are able to be realized. In this respect, such an angular lever arrangement is of a relatively simple design and an levers - the most diverse patterns of motion can be achieved. Such an arrangement of angular levers may be constructed relatively easily, and

excessive use of bearings and mountings ~~can be renounced~~. Likewise may be avoided. Similarly, camshafts, eccentric cams or suitable, circular guides ~~can serve as an influence on the motion cycle~~. By ~~may~~ also serve to affect the pattern of motion. By a suitable combination of transmission elements ~~resp. several or multiple transmissions or the like, switching between different motion patterns can also take place~~ may also be done between various patterns of motion.

~~Preferably the sitting surface is tilted resp.~~ The seating surface is preferably inclined or designed such that for a person in the normal sitting position shows there is an angle of over 90 degrees between the upper part of the body and the thighs. This preferably applies to all operating inclinations of the ~~sitting~~ seating surface and ~~ensures an easy~~ assures simple upright sitting. ~~For this, the sitting surface may be slightly tilted forward~~ To this end, the seating surface may also be designed with a slightly forward tilt relative to the floor.

Leg supports ~~shiftable~~ that are displaceable with the sitting surface, ~~may be intended at~~ surface may be provided on the seat. In particular, these leg supports ~~can comprise~~ may include at least one ~~shank~~ lower leg support, i.e. a device for supporting equipment for the lower part of the leg. Preferably, such a ~~shank support comprises a support surface, supporting laterally. Such a laterally supporting~~ lower leg support includes a surface providing lateral support. Such a lateral support surface promotes an ergonomically favorable posture and at the same time ensures that the user will remain ~~likewise makes it possible that a stable sitting on the moving sitting surface is possible~~. An ~~appropriate footrest can~~ stable on the moving seating surface. A corresponding footrest may be connected to the shank lower leg support.

According to wishes, these leg supports may be arranged so that they allow the user to sit sidesaddle or astride on the seat. Sitting with the legs crossed and even cross-legged with the knees moderately apart is also ~~As desired these leg supports can be arranged in such a manner that they make a kind of lady's sidesaddle sitting or a kind of gentleman' sitting possible. Also a sitting with a crossed leg position resp. sitting slightly Indian style is conceivable.~~

~~In this connection it goes without saying that~~ Of course such leg supports ~~can~~may also favorably serve to enhance a stable sitting position and thus ~~to~~also an ergonomically ~~favorable~~advantageous sitting posture independently of the other characteristics of the seat.

Moreover, the seat ~~can~~may comprise a ~~backrest~~back support, whose support surface is ~~shiftable independently of the sitting surface~~displaceable at least along a concave motion path. ~~Here the term of the path independently of the seating surface. In this context, a concave motion path defines a path of motion, that is laid out around a body, propped up at the backrest.~~ arranged around a body which is supported by the back support.

Such a ~~backrest~~back support, which is displaceable independently of the sitting surface, whose degree of freedom is preferably directed ~~on the whole preferably~~essentially perpendicularly to a vertical plane, ~~makes it possible on the one hand, with the sitting surface being at a standstill, that the back area of a sitting person can be moved pleasantly within a certain clearance.~~ enables the back area of a seated person ~~With the sitting surface moving, on the other hand, to be moved comfortably within a certain range while the seating surface is stationary. On the other hand, when the seating surface is moving, the back and thus the upper part of the body can easily follow the sitting surface movement a little, without that there will be strains in the lower vertebral area.~~

movement of the seating surface to some degree without causing strain in the area of the lower spine.

Such a ~~backrest~~back support that is displaceable along a concave motion path is also ~~favorable independently~~advantageous regardless of the other characteristics of the seat. In particular, it is also possible to

use this basic ~~inventional idea as a back reclining device or as a head support~~ resp. inventive idea as a reclining support or a headrest or even as a pillow. Here, the guide ~~resp. the guiding means are supported resp. located accordingly horizontally,~~ or the guidance means may be supported or located horizontally as appropriate, for example on a bed ~~resp. in or~~ a couch. This ~~too~~ also presents the advantage that the head ~~resp. and/or~~ the upper part of the body ~~can be pleasantly shifted or turned,~~ may be moved or turned easily without having to be ~~raised.~~ lifted. In particular, such a construction ~~can~~ may also be used as ~~pillows in~~ a pillow on a bed ~~or on~~ a couch, whereby in this case the concave motion path is ~~laid out~~ aligned around the head. The ~~head rest resp. the pillow can also comprise a shoulder resp. a backrest.~~ headrest or pillow may also include a support for the shoulders and/or back.

~~Also the backrest can be subject~~ The back support may also be subjected to a compulsory movement ~~resp. fashioned drivable. Beyond that, the backrest~~ and may be designed to be drivable. Moreover, the back support may be continuously adjustable, ~~in particular regarding the~~ particularly with respect to inclination. This applies ~~in particular~~ particularly in connection with the use of such a ~~backrest with couches resp. back support in couches and beds.~~

The seat may comprise arm supports, which are arranged ~~resilient and shiftable~~ resiliently and so as to be displaceable independently of the ~~sitting surface resp. the backrest at least in~~ seating surface and/or the back support in at least the horizontal direction. In ~~this connection~~ addition the suspension ~~can be planned~~ may be provided horizontally as well as vertically. ~~By the~~ The horizontal ~~displacement,~~ displacement allows a large radius ~~is attainable to be achieved~~ while being supported. The suspension ~~serves on the one hand~~ may be used both as a comfortable support and ~~in on the other hand as a reset into~~ order to return the arm supports to an initial position. Such arm supports are ~~favorable~~ also advantageous independently of the other characteristics of the seat ~~as well.~~

The ~~sitting~~seating surface may be provided with a heating and/or ventilation. Of course this also applies to a backrest or the remaining for a back support or the other modules of a seating layout, like device, such as headrest, arm supports, footrests or the like.

~~At the seat a sensor can be intended for the control of the self movement of the~~A sensor may be provided on the seat to monitor the movement of a sitting person. This ~~can~~may be for example a strain gauge or a dynamometer. ~~Beyond that it~~It is also possible to merely check the power consumption of the seat ~~drive~~ drive. ~~By~~unit. With such a sensor for ~~the control of the self~~monitoring the movement of the sitting person, it~~can be detected~~is possible to determine whether the sitting person "sits" is sitting positively" or ~~whether he merely lazily follows~~is just submitting passively to the movement of the ~~sitting~~seating surface. It is ~~desired~~desirable that the sitting person sits positively and follows the given movement of the ~~sitting surface on his own account however unconsciously~~seat actively yet subconsciously. It can be assumed that ~~when sitting lazily~~during lazy sitting, the power the seat requires in order to execute the movement ~~supplied by the seat is accordingly larger. Accordingly also the~~is correspondingly greater. The power consumption of the drive ~~will rise~~unit will also increase accordingly.

~~Beyond that the seat may provide means for the modification of~~In addition, the seat may include means for altering the frequency and/or amplitude of the movement, so that the movement of the seat ~~can~~may be adapted to the way of sitting. During positive sitting for example the frequency and/or amplitude of the movement ~~can~~may be reduced to a minimum. ~~However~~On the other hand, when the sitting person starts to sit "lazily", the amplitude and/or~~the~~ frequency ~~can then be modified~~may be changed accordingly, in order ~~thereby~~ to stimulate positive ~~sitting this way.~~ ~~Moreover,~~sitting. Additionally, a signal may sound when lazy sitting is detected, such as a

~~when sitting lazily a signal can sound, like a honking signal, beep, or music. By~~ With such an arrangement it is possible especially ~~also with airplane in airplane~~ or car-seats or in ~~driver's cabs of trains~~ train drivers' cabs to reduce the danger of falling asleep, since ~~in the case of falling asleep~~ a transition from positive sitting to ~~sitting lazily occurs~~. lazy occurs when a person falls asleep.

~~Also such a seat is~~ Such a seat is also suitable for therapeutic purposes. ~~In particular~~ Particularly in this connection, a drive unit with single linear actuators offset against each other ~~can be planned. For example this~~ may be provided. This offset arrangement may be realized for ~~can happen in a way that is known with~~ example such as is known in flight simulators. ~~As driving means in particular~~ Particularly servo-drives or pneumatic or hydraulic drives ~~are applicable~~ may be used as driving means. In this connection the seat ~~can~~ may particularly serve for the remobilization of persons after surgery of the lower extremities, for the strengthening ~~of the back and pelvis~~ the back and pelvic musculature and for a variable, flexible and thus ~~not one-sided load on the intervertebral disks and for the digestion support with~~ evenly distributed load on disks of the spine and in support of digestion for totally and partially paralyzed persons resp. the or for therapy of or autistic or hyperactive persons.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

Further advantages, objects and ~~characteristics~~ properties of the present invention ~~are described on the basis of~~ will be explained in the following description of ~~enclosed~~ attached drawing, in which ~~exemplarily several~~ several exemplary embodiments of a seat according to the invention are represented. In the drawing ~~show~~:

Figure 1 ~~a first seat with a sitting~~ is a schematic sectional view of a first seat having a seating surface according to the invention in schematic sectional view,

- Figure 2 is a schematic side view of a second seat
with having a sitting surface according to the
invention-in schematic side view,
- Figure 3 ~~the seat according to~~ is the seat of figure 2 in back
view,
- Figure 4 is a schematic representation of the drive
mechanism of the backrest back support of the seat
according to figure 2 and 3 resp. a headrest in schematic
representation, figs. 2 and 3 or of a headrest,
- Figure 5 ~~a third seat with a sitting surface according to the invention in schematic~~
~~sectional view,~~ is a schematic sectional view of a
third seat having a sitting surface according to
the invention,
- Figure 6 ~~a fourth seat with a sitting surface according to the invention in schematic~~
~~sectional view,~~ is a schematic sectional view of a
fourth seat having a sitting surface according to
the invention,
- Figure 7 is a schematic horizontal section of the seat
according to Fig. 6 in schematic horizontal sectional view,
- Figure 8 ~~a fifth seat with~~ is a schematic sectional view of a
fifth seat having a sitting surface according to
the invention-in a schematic cross section,
- Figure 9 is a lengthwise schematic section of the seat
according to Fig. 8-in a schematic profile,
- Figure 10 is a schematic front view of a sixth seat similar
to Figs. 6 and 7 with footrest in schematic frontal view, leg-
rest,

- Figure 11 is a side view of the seat according to Fig. 10
with ~~folded out footrest in a side view~~, leg-rest folded out,
- Figure 12 different shows various sitting positions on the seat
according to Figs. 10 and 11,
- Figure 13 is a front view of a seventh seat similar to the
one according to Figs. 6 and 7 with ~~backrest and arm~~
~~supports in a frontal view, whereby~~ back support and arm
supports, wherein the arm supports are ~~depicted~~ in a
writing position,
- Figure 14 is a side view of the seat according to Fig. 13
~~in a side view,~~
- Figure 15 shows the seat according to Figs. 13 and 14 in
similar representation as Fig. 13, whereby the arm rests and a backrest a
position similar to Fig. 13, wherein the arm
supports and a back support are in a rest
position, and
- Figure 16 is a side view of the seat according to Fig. 15
~~in a side view.~~

DETAILED DESCRIPTION OF THE INVENTION

~~With the seat represented in figure 1 a sitting surface 1 is shiftable~~
In the seat shown
in figure 1, a seating surface 1 is displaceable in its angle
of inclination around about a center of motion 3 provided between
a stable seat base 2 and the sittingseating surface 1. This is
ensuredassured by the fact that a support polerod 4, to which the
sittingseating surface 1 is rigidly fastened, attached,
is supported
at the base 2 by means of a supporting disk 5. Here the
Moreover
supporting disk 5 is movably supported to the attached to base 2, so
that the seating surface is sitting surface is shiftable in an appropriate
way, suitably displaceable,
both in sitting direction and
laterally.

~~The supporting~~Supporting disk 5 is supported at the base 2 by means of two elastic rings 6' and 6'', ~~whereby the~~6' and 6'', wherein supporting disk 5 is supported onthe lower elastic ring 6' ~~and is held from the top by the~~6' and is secured from above by second elastic ring 6''. As may be seen 6'': ~~As directly evident,~~directly, this arrangement is already sufficient; to create a ~~sitting~~seating surface 1 that is ~~shiftable in the way~~displaceable in a manner according to the invention, which provides an upright rest position.

~~Furthermore the support pole 4 comprises~~Additionally, support rod 4 includes a height adjustment 7 ~~as well as~~and a tilt adjustment 8, so that the seat ~~can~~may be adapted to individual needs.

As is evident from figure 1, ~~the support pole 4 could~~support rod 4 might also be rigidly connected tothe base 2; if an appropriate motion mechanism is provided directly under ~~the sitting~~seating surface 1, that enables a ~~shifting around~~displacement about the then virtual center of motion 3.

With the embodiment~~depicted~~ in figure 1, a counter-plate 9 is ~~intended at the end of the support pole 4 being opposite to sitting surface 1. This~~provided at the end of support rod 4 that is opposite seating surface 1. The dead weight of this counter-plate 9 serves~~by its inert mass~~ as a damping element, so that the ~~seating movement of the sitting surface 1 will not be too easy running. Beyond that,~~surface 1 is not too easily displaceable. In addition, spring elements 10 are~~intended at the~~provided on counter-plate 9, which ~~on the one hand serve as a vibration damper in support of the elastic rings 6' and 6'' and prevent on the other hand that the sitting surface 1 rotates around the support pole 4.~~not only serve to damp vibration in support of elastic rings 6' and 6'' but also to prevent seating surface 1 from rotating about support rod 4.

While the components described so far, ~~ensure a free shiftability of the sitting surface 1 around~~ far ensure free displacement of seating surface 1 about the center of motion 3, the embodiment ~~depicted~~ in figure 1 furthermore ~~comprises~~ includes a drive 11, which is effectively connected to counter ~~in an effect-related contact with the counter~~ plate 9 via an eccentric gear. Here, the gear is selected ~~in such a manner that the sitting~~ such that the seating surface executes an U-shaped ~~side-alternating~~ side-to-side rocking movement.

As is directly evident, it is also possible to mount the support ~~pole~~ rod 4 at the bottom of the base 2 and support it ~~movable in the~~ movably in supporting disk 5. By contouring the bottom of ~~the base 2 an U-shaped side-alternating high/low movement can then be achieved, like with a horse in walk.~~ base 2, a U-shaped side-to-side, alternating, up-and-down movement may be achieved, as with a horse in gait.

In this case seating surface 1 is selected in such a manner that ~~The sitting surface 1 is selected here in such a manner that it enforces it~~ constrains an upright posture with a straight back and ~~indicated hollow back, whereby~~ a normal curvature of the lower spine, wherein the thighs are ~~released~~ relieved of pressure. This upright posture together with the passive following of the active compulsory movement ~~resp. respectively~~ an appropriate compensating movement give the sitting person a feeling of security, without having a soporific effect, counteract muscle ~~cramping~~ tension and improve blood circulation ~~in~~ throughout the entire body as well as ~~improve~~ improving digestion. The well ~~cushioned~~ sprung motion causes a soft and gentle, varying load on the ~~intervertebral disks in such a manner that head, shoulders and upper part of the body can easily be kept still.~~

disks of the spine. Here, the amplitude of the movement is selected such that the head, shoulders and upper part of the body can easily be kept still.

~~An U-shaped side alternating movement is of advantage in particular~~ A U-shaped side-to-side alternating movement is advantageous particularly in connection with a rigid ~~backrest,~~ back support, since with such a movement ~~with each side alternation~~ the buttocks are moved away from the ~~backrest,~~ back support with each change of side, so that a movement of the buttocks conditioned hereby, as well as the respective subsequent movement of the back reduces friction at on the backrest and ~~so~~ does not ~~lead to~~ cause stress or tension with the ~~backrest. This is of importance especially with the use as car seats, airplane seats or driver's cabs of trains.~~

back support. This is significant especially for its use in car seats, airplane seats or train drivers' cabs.

The seat ~~depicted in figures 2 and 3 corresponds basically to the seat depicted in figure 1. However, with the former, yet two shank supports 12 are provided at the sitting surface 1, which are fastened to the sitting~~ shown in figures 2 and 3 is essentially similar to the seat in figure 1. However, in the former, two lower leg supports 12 are also provided at seating surface 1, and are fastened to seating surface 1 by means of mounting devices 12'. ~~On one hand the shank supports 12 provide~~ 12'. On one hand, lower leg supports 12 are equipped with laterally supporting outwardly directed supporting surfaces, which enable a sitting position similar to that of a horseman. ~~Beyond that, the~~ Moreover, supports 12 also ~~comprise~~ include one footrest each, so that the entire lower body can follow the moving ~~sitting~~ seating surface 1, while with the embodiment depicted in figure 1 the feet rest on the ground.

By means of ~~the~~ mounting devices 12' ~~the~~ 12' supports 12 ~~can~~ may also be adjusted in such a manner that a sitting position similar to a lady's ~~side saddle or sitting slightly with folded legs~~ side saddle or cross-legged with knees moderately apart is possible.

~~Beyond that,~~ In addition, the seat according to figures 2 and 3 comprises a ~~backrest,~~ back support, whose supporting surface 13 ~~can be shifted along~~ may be displaced on a concave motion path independently

of ~~the sitting~~ seating surface 1. For this, the ~~backrest is fixed stationary~~ regarding the back support is immovably secured with respect to base 2 of the seat by means of a base 14, and ~~the~~ supporting surface 13 may be ~~shifted~~ displaced over a guide 15 ~~in reference to the relative~~ to base 14. As ~~evident~~ is clear in particular from figure 4, ~~the~~ guide 15 ~~comprises~~ includes a concave curved ~~guide-way~~ guidebar 17, along which ~~travels~~ a carriage 16 travels with the supporting surfaces 13. As ~~is likewise comprehensible~~ may also be understood from this figure, the term ~~of the concave motion path~~ "concave motion path" refers to the supporting surface 13 ~~resp. and/or~~ to a body resting on this supporting surface. A construction as ~~depicted in figure 4 can also find use as shoulder, neck or headrest resp.~~ shown in figure 4 may also be used as a shoulder, neck, or headrest and/or as a pillow. In particular, ~~also~~ a combination of ~~head, neck, shoulder and/or backrest~~ head, neck, shoulder, and/or back support is conceivable. Here, the form of the supporting surface is adapted to the head movement ~~resp. to and/or~~ a body movement and the ~~guide-way~~ guidebar is suitably supported.

~~So in the head area~~ Accordingly, the supporting surface ~~can~~ may be designed substantially thicker at the sides in the head region, so that when the body turns, the head is supported in a comfortable position in reference relative to that shoulder then ~~situated below.~~ located therebelow.

~~Beyond that, the supporting~~ Supporting surface 13 of the ~~backrest can be~~ shifted back support may also be displaced resiliently along a diagonal ~~guide-way 15',~~ guide 15', so that if need be the ~~backrest resp.~~ the back support or supporting surface 13 can follow the movement of the ~~sitting~~ seating surface.

~~Beyond that,~~ In addition, the seat according to figures 2 and 3 ~~comprises~~ is furnished with a supporting lever 18, to which ~~on the one hand~~ lighting fixtures 19 ~~and on the other hand forearm~~ as well as forearm

supports 20 are ~~fastened~~attached. The lighting fixtures are positioned in such a manner that a person sitting in this seat at a computer workstation (~~drawn by a broken~~(indicated by dotted line)) is not dazzled.

~~The arm supports 20 are carried out as bent half shells and by means of suspensions 21~~Arm supports 20 are conformed as angled half shells and are attached resiliently at the supporting lever 18. Here, the suspensions 21 are fastened at the supporting lever 18 wider apart from each other than shoulder width. By this way, the supports 20 do not hinder, when not in use. Furthermore the to supporting lever 18~~supports 20 are suspended resiliently, whereby a pressure resp. speed-depending lock is provided, so that the armrest 20 can be used as a support for rising out of the seat, when it is loaded jerkily.~~

~~As can be seen in figure 2, the person in a rest position can rest against the supporting surface 13 of the backrest, while also the sitting surface can be brought into a neutral position. In particular it is possible in this rest position to leave the arms in the forearm supports 20 so that they remain in a relaxed position, while the person is resting. By remaining in the forearm support it is ensured that an even blood circulation of the body is maintained, in particular to prevent too much blood accumulating in the arms.~~

~~It understands itself that such resilient arm rests can also be positioned resiliently from below or from the rear resp. the front and are also favorable independently of the other characteristics of the seat resp. the chair.~~

by means of suspensions 21. Here, the distance between suspensions 21 as they are attached to supporting lever 18 is wider than shoulder width. In this way, supports 20 do not get in the way when they are not in use. Furthermore, supports 20 are suspended resiliently, wherein a pressure- and/or speed-dependent locking system is provided, so that armrest 20 may be used as a support for rising out of the seat, if it is loaded suddenly.

As is shown in figure 2, the person in a resting position may rest against supporting surface 13 of the back support, and the seating surface may be brought into a neutral position at the same time. In particular it is possible in this rest position to leave the arms in forearm supports 20 so that they remain in a relaxed position while the person is resting. Remaining in the forearm support ensures that even circulation of the blood throughout the body is maintained, particularly preventing the accumulation of too much blood in the arms.

Of course, such resilient arm supports may also be positioned resiliently from below or from the rear or the front, and may also advantageous independently of the other characteristics of the seat and/or chair.

Here the long suspensions 21 provide a large area, within which the arms are supported and freely movable. ~~Thereby, With this,~~ neck tension may be avoided effectively.

The seat ~~can also comprise a loin support resp.~~ may also include a lumbar support and/or a neck support, which ~~on the one hand - if need be - may be firmly connected with the sitting surface 1 or on the other hand -~~ optionally - may be securely attached to seating surface 1 or may be fashioned independently of this ~~sitting~~seating surface 1. In particular, these may also be ~~shiftable~~displaceable along a concave motion path, similarly to the ~~backrest~~back support.

~~With the seat depicted in figure 5~~In the seat shown in figure 5, the necessary mechanisms for the movement of ~~the sitting surface 1~~'seating surface 1' are positioned directly under the same in a ~~housing 2~~'housing 2'' supported on three legs 2'. ~~Here, the sitting surface 1 is 2'.~~ Here, seating surface 1' is pivotably mounted on a support 4' ~~so that it is able to wobble accordingly,~~4' by means of two elastic rings 6' and 6'' ~~as well as 6' and 6''~~ and several supporting springs 10'. ~~An appropriate mounting plate of the sitting surface 1' embraces a support plate 5' at the support 4', over resp. under 10'.~~ A corresponding holder of seating surface 1' surrounds a support plate 5' at support 4', above or below which the elastic rings 6' or 6'' are arranged. ~~By this, the seat can be raised resp. shifted at its sitting surface 1' and nevertheless a movability~~6' and/or 6'' are arranged. In this way, the seat may be raised or displaced at its seating surface 1', but the mobility according to the invention is preserved. Supporting springs 10' here are also used ~~ensured~~. ~~The supporting springs 10' here also serve for resetting the sitting surface against an unwanted~~to reset the seating surface in the event of unintended rotation of the same.

~~The elastic rings 6', 6'' could~~Elastic rings 6', 6'' might also be realized by an elastic ring ~~resp. a tube positioned at or a tube encircling the outer circumferential area.~~

~~With the embodiment depicted in figure 5, the forced movement of the sitting surface 1'~~In the embodiment shown in figure 5, the constraining movement of seating surface 1' according to the invention is ensured~~assured~~ by a driven driving ring 11', cam 11', which rotates around support 4' and drives spacers 11'', that rotate on a the support 4' and which ~~powers spacers 11'', that rotate on a guide way 11''' with the drive ring 11'.~~The guide way 11''' ~~is profiled so~~guideway 11''' with the cam 11'. Guide 11''' is shaped in such manner that a desired modification of the angle of inclination is achieved.

As is also directly evident from figure 5, a central supporting base may be used instead of the supports 2', ~~like at a known desk chair.~~ Likewise it is possible to completely do without the supports 2'2', as for a known office chair. It is also possible to dispense entirely with supports 2' and to arrange the arrangement on the ground or on a normal seat. ~~Arranged~~When arranged on the ground or on a low stool, this arrangement ~~can serve as a stand~~may serve as an underlay for standing, in particular particularly during standing activities at machines ~~or~~and the like, or ~~in addition, as a footrest.~~also as a footstool. In particular it is also possible to combine such a ~~footrest~~footstool with the seats as ~~depicted~~shown in figures 1 to 3.

The embodiment ~~depicted in figure 5~~ also is suitable in particular for a chair/standing-stool combination, with the sitting surface being shown in figure 5 is also particularly suitable for a seat/standing seat combination, in which the seating surface is moved from a sitting position into a stand-sit position~~semi-standing position~~ of the user by means of a gas spring or similar lifting devices. In the sitting position ~~a person can then take up~~position, a person may then assume a position for clerical~~written~~ work or the like, while the stand-sit position~~semi-standing position~~ is used for activities ~~which can~~that may also be carried out while standing too. The ~~stand-sit position~~ may be intended ~~offset to~~standing. The semi-standing position may be provided offset from the sitting position ~~in a way~~so that in particular ~~stand-sitting is~~semi-standing is

easily possible without ~~restriction by a footrest or a low positioned~~ obstruction by a footstool or a low work-surface.

By ~~replacing~~ substituting the drive components, ~~in particular the guide-way 11''' different courses of motion can~~ particularly guideway 11''', different patterns of motion may be realized in a particularly simple way ~~at an arrangement~~ with the configuration according to figure 5. ~~Likewise~~ Similarly, another kind of drive may also be conceivable. In particular, a drive comprising ~~of linear drives offset to each other may be used as well, as they find use for example with~~ against other may be used, such as are used for example in flight simulators.

~~Also the seats depicted in figures 6 to 9 have a sitting surface 1''' resp. 1''', which is shiftable around~~ The seats shown in figures 6 to 9 also have a seating surface 1'' or 1''', which is displaceable about a center of motion. ~~This~~ However, this center of motion ~~however~~ is shifted continuously with the movement of seating surface 1'' ~~the sitting surface 1''' resp. 1''', so that the~~ or 1''', so that the complex movement is better ~~being~~ described in ~~its complexity in general~~ general terms.

While the movement of ~~the sitting surface 1''' with~~ seating surface 1'' in the embodiment ~~depicted~~ shown in figures 6 and 7 ~~corresponds best to~~ most closely resembles the movement of a saddle on horseback, the movement of ~~the sitting surface 1'''~~ seating surface 1''' in the embodiment as ~~shown in depicted in Figs. 8 and 9~~ corresponds best with figures 8 and 9 is more like the movement of a saddle on an ambler.

Both seats are characterized by a ~~sitting surface being forced~~ seating surface that is constrained to move continuously and cyclically, ~~whereby~~ wherein means are ~~intended, which~~ provided that shift a center of motion corresponding to the movement of the ~~sitting~~ seating surface. All known seats ~~resp. and/or~~ devices according to prior art however ~~show a fixed center of motion, which~~

~~can be shifted in its height if need be by means of control members that are lockable again, while it however~~ have a fixed center of motion, which may be displaced with respect to height as necessary by relockable control members, whereas the center of motion itself remains in place during the rotary motion itself.

~~Beyond that both seats provide means, which~~ In addition, both seats include means that force at least one point of ~~the sitting surface 1'' resp. 1''~~ 'seating surface 1'' or 1''' to move continuously and cyclically in at least two directions of motion periodically, ~~whereby the period~~ wherein the number of periods in one direction of motion is larger than the ~~period~~ number of periods in the other direction of motion. ~~Preferably the one period~~ Preferably, one number of periods is exactly twice as large as the number of the other period. Thus a rocking or swinging ~~other period. Thereby a seesaw resp. a tilting motion can be achieved, how it~~ motion may be achieved, as is ultimately realized with the ~~examples of~~ exemplary embodiment ~~depicted shown~~ in figures 6 to 9.

In order to realize this, the embodiment ~~depicted shown~~ in figures 6 and 7 comprises two rocker arms 30 ~~at the base 2'''~~, which in each case support the sitting surface 1'' by a ball joint. ~~The sitting surface 1'' beyond that, is on base 2'''~~, each of which supports sitting surface 1'' via a ball joint. Seating surface 1'' is further supported by means of a support 31, likewise ~~by~~ via a ball joint. ~~The support 31 provides~~ Support 31 includes a gas pressure spring for height adjustment as well as for ~~the increase of~~ increasing sitting comfort and is supported in a ball cup 32 preferably made from nylon or a similar anti-friction material.

For ~~comfort increase the seat comprises still beyond that~~ improved comfort, the seat further includes additional upholstery 33, which is rigidly connected with ~~the base 2'''~~ base 2'''.

The rocker arms are driven by ~~means of~~ a Bowden cable 35 ~~led passed~~ through reels 34, which is ~~forced~~ constrained to move continuously and cyclically by a motor 36, ~~as well as by~~

as well as by return motion springs 37. By the cyclic raising of the toggle joints ~~the sitting surface 1'' joints~~, seating surface 1'' is shifted on the one hand ~~with~~ at a certain frequency from right to left, ~~wherebywherein~~ the exact position of ~~the sitting surface 1'' is determined by geometry of the rocker arm 30 and support 31. With double frequency however the sitting surface 1''~~ seating surface 1'' is determined by the geometry of rocker arms 30 and support 31. At the same time, as is directly evident, seating surface 1'' is also displaced with double frequency backwards and forwards respectively up and down. ~~beyond that is shifted to the front and to the back resp. in its height too, as is directly evident.~~ In this way a rocking motion results similar to ~~the one of a~~ that of the saddle on a horse, which has an extremely ~~calming-down, even a~~ calming, even therapeutic effect.

~~It understands itself that instead of the ball and socket joints also different joints,~~ Of course other joints, such as for example toggle joints with sufficient ~~clearance, play,~~ or sufficiently rigid springs ~~can find use.~~

~~may be used~~ The embodiment depicted in figures the 8 and 9 indicates for a realization ~~however two rigidly connected ball bearing disks 41, which are mounted eccentrically and with an angle of inclination and which are arranged underneath the sitting surface 1''' and support it. The ball bearing disks 41 are rotary driven by a drive 42 and are supported on a shaft 43. Beyond that the sitting surface 1''' is secured against an unintentional tipping by a guide, that is not shown.~~

~~Through rotating the ball bearing disks 41, the sitting surface 1''' is stimulated into a rocking movement, which corresponds for instance to the motion of a saddle on an ambler. Here, the sitting surface 1''' moves with half a revolution~~

instead of the ball and socket joints.

In contrast, the construction of the embodiment shown in figures 8 and 9 includes two rigidly connected ball bearing disks 41, which are arranged eccentrically and at an angle of inclination and are located underneath seating surface 1''' so as to support it. Ball bearing disks 41 are driven in rotary manner by a drive 42 and are mounted on a shaft 43. In addition, seating surface 1''' is secured against inadvertent tipping by a guide, which is not shown.

By the rotation of ball bearing disks 41, seating surface 1''' is stimulated into a rocking movement, which resembles for instance the motion of a saddle on an ambler. Here, seating surface 1''' moves from one side to the other with every half revolution of ball bearing disks 41

~~of the ball bearing disks 41 from one side to the other, as depicted~~ shown in figure 9. At the same ~~time the sitting surface 1''~~ time, seating surface 1''' wobbles during this movement because of the twisted position created by the eccentricity of the ball bearing disks 41 ~~due to a twisted position, as evident in particular from~~ 41, as is shown particularly in Fig. 8. This wobbling motion shows the double frequency of the lateral ~~movement~~ motion.

Instead of the mechanical arrangements shown, ~~different drives can find use as well. In particular means, which shift~~ other drive units may also be used. Particularly means that displace the center of motion according to depending on the movement of the sitting seating surface, ~~resp. means, which~~ or means that force at least one point of ~~the sitting surface 1'' resp. 1'''~~ seating surface 1'' or 1''' to move continuously and cyclically in at least two directions of motion periodically, may ~~additionally comprise~~ further include control devices like such as electrical or electronic controls, and appropriate corresponding driven actuators or other driving means for the sitting seating surface and its angle of inclination.

The embodiment ~~depicted~~ shown in the figures 10 to 12 corresponds ~~basically to the one depicted~~ essentially with that shown in figures 6 and 7. Here ~~too a seat is intended with a sitting surface 1''~~ too, a seat is provided with a seating surface 1'' that is tilted slightly forward and executes a movement, which ~~corresponds basically to a movement like when riding~~ essentially resembles a riding movement. This movement may be ~~made possible~~ assured by an arrangement ~~which is~~ corresponding to an arrangement according to figures 6 and 7.

~~Beyond that~~ In addition, this seat comprises a recess 50, in which a ~~leg-/footrest 51 is kept. The leg-/footrest comprises~~ leg-rest/footrest 51 is stored. The leg-rest/footrest includes at least one upper supporting surface 52 for supporting one ~~shank or both shanks as well as at least one lower supporting~~

or both lower legs, and at least one lower support surface 53 as a footrest, how this is shown in particular as is shown particularly in figure 12. With this specific example of embodiment, for either leg a lower and an upper support surface 53, 52 is provided for each leg. As 52, 53 are intended each. In this connection, as depicted is shown in the present example of embodiment, the upper supporting surface 53 can support surface 52 may be positioned, at least in part, at an angle relative to the lower supporting surface 52. lower support surface 53.

Like apparent in particular from As is shown particularly in figures 10 and 12 the leg/footrest 51 comprises leg-rest/footrest 51 includes a mirror plane 55' (depicted 55' (shown in Fig. 10). In this mirror plane 55' leg-rest/footrest 51 is movable relative to seat base 2''' and seating surface 55' the leg/footrest 51 is movable relevant to the seat base 2''' resp. the sitting surface 1'', 1'', and - if desired - can be arrested at an angle may be locked at an angled position (see figure 12). This may be realized by a pole for example, being arranged within the leg/footrest 51, that effected for example by a rod that is arranged inside leg-rest/footrest 51, and which is positioned on the ground and on which the actual leg/footrest 51 is mounted and can be arrested. In addition, there are other mounting plates resp. guides conceivable for the leg/footrest 51. If required means to move the leg/footrest 51 into another direction leg-rest/footrest 51 is lockably mounted. However, other mounting plates and guides are also conceivable for leg-rest/footrest 51. If required, means to move leg-rest/footrest 51 in another direction may also be may be provided too provided.

As evident, with this seat only one leg/footrest 51 is intended which may be seen, only one leg-rest/footrest 51 is provided with this seat, and it is suitable for both legs. However also a leg/footrest may a leg-rest/footrest may also be provided, which supports only one leg resp. only and/or one foot. This may be for example a leg support in a vehicle, which supports only that leg, with whose foot an the leg of the accelerator pedal is operated foot.

This support then ~~effects the leg in a suitable way from the outer side~~ contacts the leg appropriately from the outside.

~~With this embodiment the leg /footrest~~ In this embodiment, leg-rest/footrest 51 is connected to the seat by connecting devices means 54, which enable folding the leg /footrest 51 leg-rest/footrest 51 to be folded into or out of the recess. 50. On the other hand it is also conceivable that leg-the leg /footrest 51 isrest/footrest 51 may be arranged separately from the seat. Likewise-the Similarly, connecting devices means 54 may permit another type of a relative motion between leg-rest/footrest and the rest of the seat like shifting seat, such as displacement or the like.

In order to facilitate folding out the leg /footrest 51 a handle 55 is intended at its bottom, as figure 10 shows this. leg-rest/footrest 51 a handle 55 is provided on the underside thereof, as is shown in figure 10.

The seat shown in figures 13 to 16 is also essentially the same as the seat shown in figures 6 and 7. However, in the seat depicted in figures 13 to 16, a back support 13 is provided that is displaceable along a concave ~~Also, the seat depicted in figures 13 to 16 corresponds basically to the seat depicted in figures 6 and 7. With a seat depicted in figures 13 to 16 however a backrest 13 is intended, which is shiftable along a concave guide way 15. The guide way 15 is fastened to the supporting guideway 15. Guideway 15 is fastened to support levers 56, which are connected at a cantilever 57 of to base 2''' at a cantilever 57 of base 2''' via an articulated joint 58. Optionally, means for locking the back support and/or stops may be the base 2''' with the base 2''' by a link joint 58. Optionally means for the arresting of the backrest and/or stops can be intended, which limit its movability. Beyond that, the backrest 13 may also be arranged swiveling around a center of motion designated on a level with the guide way 15. It understands itself that a such provided, which limit its movement. In addition, back support 13 may also be arranged to pivot about a center of motion provided on a level with guide 15. Naturally, such an arrangement of the back support is also arrangement of the backrest is also favorable advantageous independently of the other characteristics of the seat.~~

~~Beyond that, at the upper ends of the supporting levers 56 spring levers 59 are intended, to which the arm supports 60 as well as armrests 61 are fastened. The spring levers 59 are shiftable together with the backrest~~Further, spring levers 59 are provided at the upper ends of support levers 56, to which upper arm supports 61 and lower arm supports 60 are attached. Spring levers 59 are displaceable together with back support 13 between a writing position (see figures 13 and 14) and a rest position (see figures 15 and 16).

In the writing ~~position the backrest~~position, back support 13 is tilted forward and supports the back only slightly, ~~whereby~~wherein by the U-shaped movement the buttocks of a sitting person are moved somewhat forward during a lateral movement, so ~~forward, when a sideways movement is in effect, so that especially a~~that specifically strain of the back area ~~is avoided by~~due to the relative motion between back and ~~backrest 13, even if the backrest 13 would be~~back support 13 would be avoided even if back support 13 were rigidly arranged, ~~as this is the case~~ for example ~~within~~ a motor vehicle. However because of the concave motion path of the ~~backrest this doesn't make any difference~~back support this has no effect with this seat.

~~Beyond that the~~In addition, spring levers 59 are outwardly curved in the writing position and ~~embrace the levers as well as~~surround the arms and the arm supports 60 from the outside. Because of the suspension, the person ~~can~~may still move the arms~~nevertheless~~ to different positions; without leaving the arm supports, so that the supporting function is ~~maintained~~maintained.
~~nevertheless.~~

In the rest position, the spring levers 59 are ~~turned~~rotated about a center of motion ~~at the~~on upper supporting levers 56 and are ~~located on them. Thereby~~supported thereon. As a result, the spring travel is shortened, so that the arm supports 60 are ~~more rigidly supported.~~supported more rigidly. In this way they can be used as supports for ~~rising.~~standing up.

~~Beyond that, the armrests 61 are then situated~~Moreover, arm supports 60 are then located in a position for ~~being used, and the person can lean back use,~~ and a person may recline comfortably and relaxed. ~~It understands itself that~~Of course, such a separate arrangement of the arm supports 60 ~~can be favorable~~may be advantageous independently of seating the seat face 1'' and the backrest surface 1'' and back support 13. This also applies in particular to the centers of motion ~~designated~~provided above the shoulders of a sitting person ~~as well as~~and to the arrangement of the arm supports 61 ~~movable within limits~~60 with a defined range of movement in a writing position.

~~At this seat, beyond that a headrest can be intended too.~~On this seat, a headrest may also be provided. It is preferably not directly connected to the ~~backrest but is~~back support, but separately fastened to the seat in an appropriate way. Likewise lateral supports ~~can be intended also, which~~may also be provided that support under the armpits, ~~resp. a stomach- or a loin support and/or a chin- resp.~~and/or a stomach-/or a lumbar support and/or a chin and/or neck-support. The ~~stomach support resp. the loin support can~~stomach support and/or lumbar support may be implemented ~~shiftable~~displaceably with a concave path of motion similarly to the backrest.

ABSTRACT OF THE DISCLOSURE

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The invention relates to a seat with a stable base wherein the angle of inclination of the seating surface can be moved around a pivot provided between the base and the seating surface, the latter being forced to move continuously and cyclically.



Subspec

- 1 -

TITLE OF THE INVENTION

SEAT

- 5 The invention relates to a seat, particularly a seat having a stable base and with a seating surface and with an upper-body support.

BACKGROUND OF THE INVENTION

10

C2
15 Various attempts have been made to design seats that support an ergonomic sitting posture, particularly in respect of office chairs and seats for PC workstations. Accordingly, there are designs that resemble rocking-chairs, seats with knee supports and seat-balls. However, all these seats give rise to relatively tense sitting postures, since on the one hand the moving seating surface must be stabilized, and on the other, parts of the body such as the shins, cruciate ligaments and the extremities
20 of the foot are placed under unaccustomed stress.

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GROUP 3600

CROSS REFERENCE TO RELATED APPLICATIONS

There are also seats having forcibly driven seating surfaces, as are disclosed for example in German Patent No. 5 DE 33 24 788 A1 and in European Patent Nos. EP 0 311 993 A2 and EP 0 574 073 A1. However, the seats described in these documents are relatively limited in the motion of their seating surfaces and usually only allow the seating surface to be displaced in one direction, for example up and down 10 as in EP 0 311 993 A2 or turning from side to side as in EP 0 574 073 A1. Only the DE 33 24 788 A1 discloses a seat having a seating surface which is displaceable in two directions of motion, this being effected by lifting means that can raise the seating surface, and in this connection 15 the seating surface can be raised and lowered in the same plane and may be tilted laterally in a circle.

Unlike the above, it is object of the present invention to create a seat with a particularly ergonomically movable 20 seating surface.

The invention suggests a seat having the characteristics of patent claim 1.

- 1b -

BRIEF SUMMARY OF THE INVENTION

Unlike all known seats the body does not need to tense up
to keep the seating surface in position. The muscle work
5 that is actually desirable with all known seats as well, is
assured

by the fact that the body must follow the movement of the seat. In this respect, the human body has been accustomed to imitating such movement from an early age, for example from being carried by the mother, or when walking or riding. It is common knowledge that such constraining movements have a relaxing effect and may even serve therapeutic purposes. The moving seating surface is not intended to perform a vibratory movement, but instead a pleasant, gentle and even motion. Additional vibratory movements would be conceivable.

Naturally, the amplitude is adjusted to this motion in such manner that it is possible to keep the upper part of the body almost still. By continuously following the movement of the seating surface while the upper part of the body remains practically stationary, very many muscles are exercised during sitting without becoming tensed. The advantages of a seating surface having a continuous and cyclical constraining movement become apparent particularly when the seat or the seating surface are realized in such manner that they encourage, or possibly even constrain an upright sitting posture. Seating surfaces of such kind are known, for example a seating surface may be used that borrows its shape from the saddle. In particular, the seating surface may be configured such that an upright sitting posture may be assumed with a straight back and a normal curvature of the lower spine, the upper thighs being relieved of pressure.

Such an upright sitting posture may be assured with the appropriate selection of the seating surface by altering the angle of

inclination of the seating surface. Such displacement may advantageously be effected in the direction of sitting as well as laterally. In particular, it is also possible to rotate the seating surface slightly relative to the horizontal. Likewise, provision may be made to displace the seating surface relative to the vertical.

Means may be provided that force at least one point of the seating surface to move continuously and cyclically in at least two directions of motion periodically, whereby the number of one period is larger, preferably twice as large, as the number of the other period. In this way, a movement resembling a walking movement may be simulated by relatively simple means, such as occurs when riding in alternating or ambling gait, or when being carried. In particular it is possible that for the execution of such movements the seating surface may be tilted accordingly.

In addition the seat may comprise a preferably stable base and a seating surface that may be shifted in its angle of inclination about a center of motion. With such an arrangement, regardless of the other characteristics of the seat, it is possible to assure not only a movement that relaxes the body during sitting, but also an ergonomically favorable body posture with respect to a workstation or a work surface. Accordingly the stable base ensures that a central position, for example in front of a monitor or a keyboard cannot be left, yet a slight movement of the body is carried out - whether voluntarily or in response to force.

In particular, it is also possible to shift the center of motion, preferably in its distance from the seating surface and/or in its distance from the base. In this way, both the change in the angle of inclination and the height of the seating surface may be influenced. The movement may also be developed in such a manner that one specific center of motion is not defined and only the inclination of the seating surface may be altered accordingly.

10 In particular it is also possible, to shift the center of motion depending on the displacement of the seating surface so that the course of motion for the seating surface may be selected relatively freely.

15 Regardless of whether the angle of inclination of the seating surface is changed freely or forcibly, the seating surface may be supported resiliently. This may be achieved for example by a spring element that acts between the mounting of the seating surface and the base thereof. It is also possible to provide a suitable resilient guide for the seating surface. Such a suspension means eliminates sharp movements that would disturb an even course of motion and lead to tension, and would also have the consequence that the compensating movement carried out subconsciously in response to the seat would become conscious suddenly and in an undesirable way and so cause distraction from a concentrated activity.

30 Of course, the seating surface does not have to be displaceable about a physically existing center of motion. Instead, a suitable guide

may also be provided for the seating surface that shifts it about a virtual center of motion. Such a guide may be arranged for example directly underneath the seating surface itself, so that the entire base below the seating
5 surface may be designed as a normal seat-base in known manner, possibly even with casters or the like.

In particular, this last arrangement may be realized as a footstool or a stand, instead of a seating surface,
10 standing directly on the ground and being forced to move continuously and cyclically. Under these circumstances, of course all the patterns of motion previously described may still be realized for this footstool or stand, and similar advantages may be achieved. The seating surface according
15 to the invention is especially suitable for office chairs. With such application a stable base provides a particularly suitable method for ensuring that a person maintains the correct posture as prescribed with respect to a work surface or a computer. In particular, the invention may
20 also be installed in motor-vehicles, and/or in the form of car seats. Here in particular, it may successfully prevent symptoms of fatigue during long journeys. A hazard potential may be reduced by the movement being switched off in emergency situations. Likewise, a seat according to the
25 invention may be used with train drivers' cabs and in airplanes, with the same advantages obtained. Moreover, it is possible to use a seat according to the invention as a reclining aid, if its design is of correspondingly low construction, or if it is integrated into a couch. In an
30 application of such kind, a seat according to the invention may be effective

against bedsores. A seat according to the invention may also be provided in the form of an armchair.

As has been described in the foregoing, the seating surface
5 or footstool or stand may be moved forward and backward, up
and down as well as laterally. In particular, however,
tumbling gyrating motions are also possible (such as are
performed for instance in a Hula or belly-dance) or
tumbling vertical gyrating motions (similar to a roller-
10 coaster). In addition, however, the seating surface may
also execute a rocking, U-shaped motion in which the sides
rise and fall alternately, as with a horse in gait, or a
swinging motion as with an ambling camel. A movement
similar to the leap of a dolphin is also possible, in which
15 the seating surface is moved forward in an arc and then
straight backward. Naturally, other movements are
conceivable as well, which may be selected especially in
accordance with the feeling of well-being of the user, or
also for medical purposes.

20

In order to assure the desired movements, all known drive
means, guides and transmissions may be used. Thus a desired
movement may be generated for example by a sliding pin
guided in a groove. However, it is also possible to drive
25 the seating surface using an appropriate gear linkage. In
particular an arrangement of angular levers may be provided
by which - depending upon the precise configuration and
arrangement of the angular levers - the most diverse
patterns of motion can be achieved. Such an arrangement of
30 angular levers may be constructed relatively easily, and

excessive use of bearings and mountings may be avoided. Similarly, camshafts, eccentric cams or suitable, circular guides may also serve to affect the pattern of motion. By a suitable combination of transmission elements or multiple
5 transmissions or the like, switching may also be done between various patterns of motion.

The seating surface is preferably inclined or designed such that for a person in the normal sitting position there is
10 an angle of over 90 degrees between the upper part of the body and the thighs. This preferably applies to all operating inclinations of the seating surface and assures simple upright sitting. To this end, the seating surface may also be designed with a slightly forward tilt relative
15 to the floor.

Leg supports that are displaceable with the sitting surface may be provided on the seat. In particular, these leg supports may include at least one lower leg support, i.e. a
20 device for supporting the lower part of the leg. Preferably, such a lower leg support includes a surface providing lateral support. Such a lateral support surface promotes an ergonomically favorable posture and at the same time ensures that the user will remain stable on the moving
25 seating surface. A corresponding footrest may be connected to the lower leg support.

According to wishes, these leg supports may be arranged so that they allow the user to sit sidesaddle or astride on the seat. Sitting with the legs crossed and even cross-legged with the knees moderately apart is also conceivable.

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Of course such leg supports may also favorably serve to enhance a stable sitting position and thus also an ergonomically advantageous sitting posture independently of the other characteristics of the seat.

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Moreover, the seat may comprise a back support, whose support surface is displaceable at least along a concave motion path independently of the seating surface. In this context, a concave motion path defines a path of motion, that is arranged around a body which is supported by the back support.

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Such a back support, which is displaceable independently of the sitting surface, whose degree of freedom is preferably directed essentially perpendicularly to a vertical plane, enables the back area of a seated person to be moved comfortably within a certain range while the seating surface is stationary. On the other hand, when the seating surface is moving, the back and thus the upper part of the body can easily follow the movement of the seating surface to some degree without causing strain in the area of the lower spine.

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Such a back support that is displaceable along a concave motion path is also advantageous regardless of the other characteristics of the seat. In particular, it is also possible to

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use this basic inventive idea as a reclining support or a headrest or even as a pillow. Here, the guide or the guidance means may be supported or located horizontally as appropriate, for example on a bed or a couch. This also
5 presents the advantage that the head and/or the upper part of the body may be moved or turned easily without having to be lifted. In particular, such a construction may also be used as a pillow on a bed or a couch, whereby in this case the concave motion path is aligned around the head. The
10 headrest or pillow may also include a support for the shoulders and/or back.

The back support may also be subjected to a compulsory movement and may be designed to be drivable. Moreover, the
15 back support may be continuously adjustable, particularly with respect to inclination. This applies particularly in connection with the use of such a back support in couches and beds.

20 The seat may comprise arm supports, which are arranged resiliently and so as to be displaceable independently of the seating surface and/or the back support in at least the horizontal direction. In addition the suspension may be provided horizontally as well as vertically. The horizontal
25 displacement allows a large radius to be achieved while being supported. The suspension may be used both as a comfortable support and in order to return the arm supports to an initial position. Such arm supports are also advantageous independently of the other characteristics of
30 the seat.

The seating surface may be provided with heating and/or ventilation. Of course this also applies for a back support or the other modules of a seating device, such as headrest, arm supports, footrests or the like.

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A sensor may be provided on the seat to monitor the movement of a sitting person. This may be for example a strain gauge or a dynamometer. It is also possible to merely check the power consumption of the seat drive unit.

10

With such a sensor for monitoring the movement of the sitting person, it is possible to determine whether the sitting person "is sitting positively" or is just submitting passively to the movement of the seating surface. It is desirable that the sitting person sits

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positively and follows the given movement of the seat actively yet subconsciously. It can be assumed that during lazy sitting, the power the seat requires in order to execute the movement is correspondingly greater. The power consumption of the drive unit will also increase

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In addition, the seat may include means for altering the frequency and/or amplitude of the movement, so that the movement of the seat may be adapted to the way of sitting.

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During positive sitting for example the frequency and/or amplitude of the movement may be reduced to a minimum. On the other hand, when the sitting person starts to sit "lazily", the amplitude and/or frequency may be changed accordingly, in order thereby to stimulate positive

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sitting. Additionally, a signal may sound when lazy sitting is detected, such as a

beep, or music. With such an arrangement it is possible especially in airplane or car-seats or in train drivers' cabs to reduce the danger of falling asleep, since a transition from positive sitting to lazy occurs when a
5 person falls asleep.

Such a seat is also suitable for therapeutic purposes. Particularly in this connection, a drive unit with single linear actuators offset against each other may be provided.
10 This offset arrangement may be realized for example such as is known in flight simulators. Particularly servo-drives or pneumatic or hydraulic drives may be used as driving means. In this connection the seat may particularly serve for the remobilization of persons after surgery of the lower
15 extremities, for the strengthening the back and pelvic musculature and for a variable, flexible and thus evenly distributed load on disks of the spine and in support of digestion for totally and partially paralyzed persons or for therapy for autistic or hyperactive persons.

20

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

Further advantages, objects and properties of the present
25 invention will be explained in the following description of attached drawing, in which several exemplary embodiments of a seat according to the invention are represented. In the drawing:

30 Figure 1 is a schematic sectional view of a first seat having a seating surface according to the invention,

Figure 2 is a schematic side view of a second seat having a sitting surface according to the invention,

5 Figure 3 is the seat of figure 2 in back view,

Figure 4 is a schematic representation of the drive mechanism of the back support of the seat according to figs. 2 and 3 or of a headrest,

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Figure 5 is a schematic sectional view of a third seat having a sitting surface according to the invention,

15 Figure 6 is a schematic sectional view of a fourth seat having a sitting surface according to the invention,

20 Figure 7 is a schematic horizontal section of the seat according to Fig. 6

Figure 8 is a schematic sectional view of a fifth seat having a sitting surface according to the invention,

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Figure 9 is a lengthwise schematic section of the seat according to Fig. 8,

30 Figure 10 is a schematic front view of a sixth seat similar to Figs. 6 and 7 with leg-rest,

- Figure 11 is a side view of the seat according to Fig. 10 with leg-rest folded out,
- 5 Figure 12 shows various sitting positions on the seat according to Figs. 10 and 11,
- 10 Figure 13 is a front view of a seventh seat similar to the one according to Figs. 6 and 7 with back support and arm supports, wherein the arm supports are in a writing position,
- Figure 14 is a side view of the seat according to Fig. 13,
- 15 Figure 15 shows the seat according to Figs. 13 and 14 in a position similar to Fig. 13, wherein the arm supports and a back support are in a rest position, and
- 20 Figure 16 is a side view of the seat according to Fig. 15.

DETAILED DESCRIPTION OF THE INVENTION

- 25 In the seat shown in figure 1, a seating surface 1 is displaceable in its angle of inclination about a center of motion 3 provided between a stable seat base 2 and seating surface 1. This is assured by the fact that a support rod 4, to which seating surface 1 is rigidly attached, is
- 30 supported at the base 2 by means of a supporting disk 5. Moreover supporting disk 5 is movably attached to base 2, so that the seating surface is suitably displaceable, both in sitting direction and laterally.

Supporting disk 5 is supported at the base 2 by means of two elastic rings 6' and 6'', wherein supporting disk 5 is supported on lower elastic ring 6' and is secured from above by second elastic ring 6''. As may be seen directly,
5 this arrangement is already sufficient to create a seating surface 1 that is displaceable in a manner according to the invention, which provides an upright rest position.

10 Additionally, support rod 4 includes a height adjustment 7 and a tilt adjustment 8, so that the seat may be adapted to individual needs.

As is evident from figure 1, support rod 4 might also be rigidly connected to base 2 if an appropriate motion
15 mechanism is provided directly under seating surface 1, that enables displacement about the then virtual center of motion 3.

With the embodiment in figure 1, a counter-plate 9 is
20 provided at the end of support rod 4 that is opposite seating surface 1. The dead weight of this counter-plate 9 serves as a damping element, so that the seating surface 1 is not too easily displaceable. In addition, spring elements 10 are provided on counter-plate 9, which not only
25 serve to damp vibration in support of elastic rings 6' and 6'' but also to prevent seating surface 1 from rotating about support rod 4.

While the components described so far ensure free displacement of seating surface 1 about the center of motion 3, the embodiment in figure 1 furthermore includes a drive 11, which is effectively connected to counter-plate 9
5 via an eccentric gear. Here, the gear is selected such that the seating surface executes a U-shaped side-to-side rocking movement.

As is directly evident, it is also possible to mount the
10 support rod 4 at the bottom of base 2 and support it movably in supporting disk 5. By contouring the bottom of base 2, a U-shaped side-to-side, alternating, up-and-down movement may be achieved, as with a horse in gait.

15 In this case seating surface 1 is selected in such a manner that it constrains an upright posture with a straight back and a normal curvature of the lower spine, wherein the thighs are relieved of pressure. This upright posture together with the passive following of the active
20 compulsory movement respectively an appropriate compensating movement give the sitting person a feeling of security without having a soporific effect, counteract muscle tension and improve blood circulation throughout the entire body as well as improving digestion. The well sprung
25 motion causes a soft and gentle, varying load on the disks of the spine. Here, the amplitude of the movement is selected such that the head, shoulders and upper part of the body can easily be kept still.

A U-shaped side-to-side alternating movement is advantageous particularly in connection with a rigid back support, since with such a movement the buttocks are moved away from the back support with each change of side, so
5 that a movement of the buttocks conditioned hereby, as well as the respective subsequent movement of the back reduces friction on the backrest and does not cause stress or tension with the back support. This is significant especially for its use in car seats, airplane seats or
10 train drivers' cabs.

The seat shown in figures 2 and 3 is essentially similar to the seat in figure 1. However, in the former, two lower leg supports 12 are also provided at seating surface 1, and are
15 fastened to seating surface 1 by means of mounting devices 12'. On one hand, lower leg supports 12 are equipped with laterally supporting outwardly directed supporting surfaces, which enable a sitting position similar to that of a horseman. Moreover, supports 12 also include one
20 footrest each, so that the entire lower body can follow the moving seating surface 1, while with the embodiment depicted in figure 1 the feet rest on the ground.

By means of mounting devices 12' supports 12 may also be
25 adjusted in such a manner that a sitting position similar to a lady's sidesaddle or cross-legged with knees moderately apart is possible.

In addition, the seat according to figures 2 and 3
30 comprises a back support, whose supporting surface 13 may be displaced on a concave motion path independently

of seating surface 1. For this, the back support is immovably secured with respect to base 2 of the seat by means of a base 14, and supporting surface 13 may be displaced over a guide 15 relative to base 14. As is clear
5 in particular from figure 4, guide 15 includes a concave curved guidebar 17, along which a carriage 16 travels with supporting surfaces 13. As may also be understood from this figure, the term "concave motion path" refers to the supporting surface 13 and/or to a body resting on this
10 supporting surface. A construction as shown in figure 4 may also be used as a shoulder, neck, or headrest and/or as a pillow. In particular, a combination of head, neck, shoulder, and/or back support is conceivable. Here, the form of the supporting surface is adapted to the head
15 movement and/or a body movement and the guidebar is suitably supported.

Accordingly, the supporting surface may be designed substantially thicker at the sides in the head region, so
20 that when the body turns, the head is supported in comfortable position relative to that shoulder then located therebelow.

Supporting surface 13 of the back support may also be
25 displaced resiliently along a diagonal guide 15', so that if need be the back support or supporting surface 13 can follow the movement of the seating surface.

In addition, the seat according to figures 2 and 3 is
30 furnished with a supporting lever 18, to which lighting fixtures 19 as well as forearm

supports 20 are attached. The lighting fixtures are positioned in such a manner that a person sitting in this seat at a computer workstation (indicated by dotted line) is not dazzled.

5

Arm supports 20 are conformed as angled half shells and are attached resiliently to supporting lever 18 by means of suspensions 21. Here, the distance between suspensions 21 as they are attached to supporting lever 18 is wider than
10 shoulder width. In this way, supports 20 do not get in the way when they are not in use. Furthermore, supports 20 are suspended resiliently, wherein a pressure- and/or speed-dependent locking system is provided, so that armrest 20 may be used as a support for rising out of the seat, if it
15 is loaded suddenly.

As is shown in figure 2, the person in a resting position may rest against supporting surface 13 of the back support, and the seating surface may be brought into a neutral
20 position at the same time. In particular it is possible in this rest position to leave the arms in forearm supports 20 so that they remain in a relaxed position while the person is resting. Remaining in the forearm support ensures that even circulation of the blood throughout the body is
25 maintained, particularly preventing the accumulation of too much blood in the arms.

Of course, such resilient arm supports may also be positioned resiliently from below or from the rear or the
30 front, and may also advantageous independently of the other characteristics of the seat and/or chair.

Here the long suspensions 21 provide a large area, within which the arms are supported and freely movable. With this, neck tension may be avoided effectively.

5 The seat may also include a lumbar support and/or a neck support, which - optionally - may be securely attached to seating surface 1 or may be fashioned independently of this seating surface 1. In particular, these may also be
10 displaceable along a concave motion path, similarly to the back support.

In the seat shown in figure 5, the necessary mechanisms for the movement of seating surface 1' are positioned directly under the same in a housing 2'' supported on three legs 2'.
15 Here, seating surface 1' is pivotably mounted on a support 4' by means of two elastic rings 6' and 6'' and several supporting springs 10'. A corresponding holder of seating surface 1' surrounds a support plate 5' at support 4', above or below which the elastic rings 6' and/or 6'' are
20 arranged. In this way, the seat may be raised or displaced at its seating surface 1', but the mobility according to the invention is preserved. Supporting springs 10' here are also used to reset the seating surface in the event of unintended rotation of the same.

25 Elastic rings 6', 6'' might also be realized by an elastic ring or a tube encircling the outer circumferential area.

In the embodiment shown in figure 5, the constraining movement of seating surface 1' according to the invention is assured by a driven cam 11', which rotates around support 4' and drives spacers 11'', that rotate on a
5 guideway 11''' with the cam 11'. Guide 11''' is shaped in such manner that a desired modification of the angle of inclination is achieved.

As is also directly evident from figure 5, a central
10 supporting base may be used instead of the supports 2', as for a known office chair. It is also possible to dispense entirely with supports 2' and to arrange the arrangement on the ground or on a normal seat. When arranged on the ground or on a low stool, this arrangement may serve as an
15 underlay for standing, particularly during standing activities at machines and the like, or also as a footstool. In particular it is also possible to combine such a footstool with the seats as shown in figures 1 to 3.

20 The embodiment shown in figure 5 is also particularly suitable for a seat/standing seat combination, in which the seating surface is moved from a sitting position into a semi-standing position of the user by means of a gas spring or similar lifting devices. In the sitting position, a
25 person may then assume a position for written work or the like, while the semi-standing position is used for activities that may also be carried out while standing. The semi-standing position may be provided offset from the sitting position so that in particular semi-standing is

easily possible without obstruction by a footstool or a low work-surface.

By substituting the drive components, particularly guideway
5 11'', different patterns of motion may be realized in a particularly simple way with the configuration according to figure 5. Similarly, another kind of drive may also be conceivable. In particular, a drive comprising linear drives offset against other may be used, such as are used
10 for example in flight simulators.

The seats shown in figures 6 to 9 also have a seating surface 1'' or 1'', which is displaceable about a center of motion. However, this center of motion is shifted
15 continuously with the movement of seating surface 1'' or 1'', so that the complex movement is better described in general terms.

While the movement of seating surface 1'' in the embodiment
20 shown in figures 6 and 7 most closely resembles the movement of a saddle on horseback, the movement of seating surface 1'' in the embodiment as shown in figures 8 and 9 is more like the movement of a saddle on an ambler.

25 Both seats are characterized by a seating surface that is constrained to move continuously and cyclically, wherein means are provided that shift a center of motion corresponding to the movement of the seating surface. All known seats and/or devices according to prior art however

have a fixed center of motion, which may be displaced with respect to height as necessary by relockable control members, whereas the center of motion itself remains in place during the rotary motion.

5

In addition, both seats include means that force at least one point of seating surface 1'' or 1''' to move continuously and cyclically in at least two directions of motion periodically, wherein the number of periods in one direction of motion is larger than the number of periods in the other direction of motion. Preferably, one number of periods is exactly twice as large as the number of the other period. Thus a rocking or swinging motion may be achieved, as is ultimately realized with the exemplary embodiment shown in figures 6 to 9.

15

In order to realize this, the embodiment shown in figures 6 and 7 comprises two rocker arms 30 on base 2''', each of which supports sitting surface 1'' via a ball joint. Seating surface 1'' is further supported by means of a support 31, likewise via a ball joint. Support 31 includes a gas pressure spring for height adjustment as well as for increasing sitting comfort and is supported in a ball cup 32 preferably made from nylon or a similar anti-friction material.

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For improved comfort, the seat further includes additional upholstery 33, which is rigidly connected with base 2'''.

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The rocker arms are driven by a Bowden cable 35 passed through reels 34, which is constrained to move continuously and cyclically by a motor 36,

as well as by return motion springs 37. By the cyclic raising of the toggle joints, seating surface 1'' is shifted on the one hand at a certain frequency from right to left, wherein the exact position of seating surface 1'' is determined by the geometry of rocker arms 30 and support 31. At the same time, as is directly evident, seating surface 1'' is also displaced with double frequency backwards and forwards respectively up and down. In this way a rocking motion results similar to that of the saddle on a horse, which has an extremely calming, even therapeutic effect.

Of course other joints, such as for example toggle joints with sufficient play, or sufficiently rigid springs may be used instead of the ball and socket joints.

In contrast, the construction of the embodiment shown in figures 8 and 9 includes two rigidly connected ball bearing disks 41, which are arranged eccentrically and at an angle of inclination and are located underneath seating surface 1''' so as to support it. Ball bearing disks 41 are driven in rotary manner by a drive 42 and are mounted on a shaft 43. In addition, seating surface 1''' is secured against inadvertent tipping by a guide, which is not shown.

By the rotation of ball bearing disks 41, seating surface 1''' is stimulated into a rocking movement, which resembles for instance the motion of a saddle on an ambler. Here, seating surface 1''' moves from one side to the other with every half revolution of ball bearing disks 41

as shown in figure 9. At the same time, seating surface 1''' wobbles during this movement because of the twisted position created by the eccentricity of ball bearing disks 41, as is shown particularly in Fig. 8. This wobbling
5 motion shows the double frequency of the lateral motion.

Instead of the mechanical arrangements shown, other drive units may also be used. Particularly means that displace the center of motion depending on the movement of the
10 seating surface, or means that force at least one point of seating surface 1'' or 1''' to move continuously and cyclically in at least two directions of motion periodically, may further include control devices such as electrical or electronic controls, and corresponding driven
15 actuators or other driving means for the seating surface and its angle of inclination.

The embodiment shown in figures 10 to 12 corresponds essentially with that shown in figures 6 and 7. Here too, a
20 seat is provided with a seating surface 1'' that is tilted slightly forward and executes a movement, which essentially resembles a riding movement. This movement may be assured by an arrangement corresponding to an arrangement according to figures 6 and 7.

25 In addition, this seat comprises a recess 50, in which a leg-rest/footrest 51 is stored. The leg-rest/footrest includes at least one upper support surface 52 for supporting one

or both lower legs, and at least one lower support surface 53 as a footrest, as is shown particularly in figure 12. With this specific embodiment, a lower and an upper support surface 53, 52 is provided for each leg. As is shown in the present embodiment, the upper support surface 52 may be positioned, at least in part, at an angle relative to lower support surface 53.

As is shown particularly in figures 10 and 12 leg-rest/footrest 51 includes a mirror plane 55' (shown in Fig. 10). In this mirror plane 55' leg-rest/footrest 51 is movable relative to seat base 2''' and seating surface 1'', and - if desired - may be locked at an angled position (see figure 12). This may be effected for example by a rod that is arranged inside leg-rest/footrest 51, and which is positioned on the ground and on which the actual leg-rest/footrest 51 is lockably mounted. However, other mounting plates and guides are also conceivable for leg-rest/footrest 51. If required, means to move leg-rest/footrest 51 in another direction may also be provided.

As may be seen, only one leg-rest/footrest 51 is provided with this seat, and it is suitable for both legs. However a leg-rest/footrest may also be provided, which supports only one leg and/or one foot. This may be for example a leg support in a vehicle, which supports only the leg of the accelerator foot.

This support then contacts the leg appropriately from the outside.

5 In this embodiment, leg-rest/footrest 51 is connected to the seat by connecting means 54, which enable leg-rest/footrest 51 to be folded into or out of recess 50. On the other hand it is also conceivable that leg-rest/footrest 51 may be arranged separately from the seat. Similarly, connecting means 54 may permit another type of
10 relative motion between leg-rest/footrest and the rest of the seat, such as displacement or the like.

In order to facilitate folding out leg-rest/footrest 51 a handle 55 is provided on the underside thereof, as is shown
15 in figure 10.

The seat shown in figures 13 to 16 is also essentially the same as the seat shown in figures 6 and 7. However, in the seat depicted in figures 13 to 16, a back support 13 is
20 provided that is displaceable along a concave guideway 15. Guideway 15 is fastened to support levers 56, which are connected to base 2''' at a cantilever 57 of base 2''' via an articulated joint 58. Optionally, means for locking the back support and/or stops may be provided, which limit its
25 movement. In addition, back support 13 may also be arranged to pivot about a center of motion provided on a level with guide 15. Naturally, such an arrangement of the back support is also advantageous independently of the other characteristics of the seat.

Further, spring levers 59 are provided at the upper ends of support levers 56, to which upper arm supports 61 and lower arm supports 60 are attached. Spring levers 59 are displaceable together with back support 13 between a
5 writing position (see figures 13 and 14) and a rest position (see figures 15 and 16).

In the writing position, back support 13 is tilted forward and supports the back only slightly, wherein by the U-
10 shaped movement the buttocks of a sitting person are moved somewhat forward during a lateral movement, so that specifically strain of the back area due to the relative motion between back and back support 13 would be avoided even if back support 13 were rigidly arranged, as for
15 example in a motor vehicle. However because of the concave motion path of the back support this has no effect with this seat.

In addition, spring levers 59 are outwardly curved in the
20 writing position and surround the arms and the arm supports 60 from the outside. Because of the suspension, the person may still move the arms to different positions without leaving the arm supports, so that the supporting function is maintained.

25 In the rest position, the spring levers 59 are rotated about a center of motion on upper supporting levers 56 and are supported thereon. As a result, the spring travel is shortened, so that the arm supports 60 are supported more
30 rigidly. In this way they can be used as supports for standing up.

Moreover, arm supports 60 are then located in a position for use, and a person may recline comfortably and relaxed. Of course, such a separate arrangement of arm supports 60 may be advantageous independently of seating surface 1''
5 and back support 13. This also applies in particular to the centers of motion provided above the shoulders of a sitting person and to the arrangement of arm supports 60 with a defined range of movement in a writing position.

10 On this seat, a headrest may also be provided. It is preferably not directly connected to the back support, but separately fastened to the seat in an appropriate way. Likewise lateral supports may also be provided that support under the armpits, and/or a stomach-/or a lumbar support
15 and/or a chin and/or neck-support. The stomach support and/or lumbar support may be implemented displaceably with a concave path of motion similarly to the backrest.